

Further evidence of this appears in the tables of separations, which are printed on parchmentised paper, and open out on each side of the stitching,

"so that if anything is spilled on to the book as it lies open at any of the tables, the result will not be so disastrous as it otherwise might be,"

and the underlying pages will be protected. This certainly suggests scale practising. Taking the author's purpose as he states it, we have carefully read the book and examined the methods prescribed. We believe certainly that the analytical methods are sound; but we should hesitate to say that, in this respect, this book is superior to a dozen others that could be named. It is written undoubtedly by one who has a mature knowledge of his subject, and the processes described satisfy all reasonable requirements in point of accuracy; but we find hardly anything noteworthy in the mode of presenting the subject or in the details—nothing certainly that will warrant us in saying that this is conspicuously *the* book for a sound method. In other respects, it makes no special claim. The sections of "Comparative Remarks" on the elements or radicals of a group are likely to be useful, but as an exposition of the theory of analysis as well as the practice the book leaves much to be desired.

Mr. Chapman Jones' second book is written to suit the syllabus of the Science and Art Department for practical inorganic chemistry in the advanced stage. The analytical part of it is adapted from the work just noticed. The rest includes the preparation of gases and some volumetric analysis. As all the topics of the syllabus are dealt with, the book will no doubt suit its immediate purpose. The mode of treatment calls for remark in one particular only. The preparations are grouped as follows:—Preparation of gases by the use of cold liquids, ditto by the use of hot liquids, ditto by the heating of dry substances, preparations involving distillation, preparations made in solutions. A protest must be entered against a mode of classification so entirely divorced from educational purpose. Even if there were practical convenience in it, which we do not admit, that would by no means justify a sequence of experiments dictated by considerations of merely having this or that piece of apparatus handy for use.

A book entitled "Advanced Inorganic Chemistry," written for "The Organised Science Series," and containing in the preface a statement that a certain liberality of treatment (of chemical physics) is justified by the importance attached in the syllabus to the subject, is calculated to raise prejudice in the mind of a reader. We make haste to say, therefore, that Dr. Bailey's book contains very little evidence, if any, of having been written to conform to a syllabus, or to provide information in that highly compressed and uninspiring form, which until recent times has seemed to prove most suitable for meeting the requirement of the Science and Art Department. The book begins with a short account of the properties of gases, including a good account of Avogadro's hypothesis, of dissociation, and of the methods of determining the composition of gases. In stating that equal volumes of *all* gases . . . contain the same number of molecules, the author, we think, underlines the wrong

word. The whole advance made by Avogadro is surely embodied in the word *molecules*: it was not the introduction of the idea of equal numbers (as beginners are so often taught), nor the mere extension of an existing generalisation. The chapter on the atomic weights of the elements is excellent in most respects, but we regret to see the statement that a measure of the chemical attraction or affinity exerted between two elements is afforded by the heat developed by their union. An unqualified statement of this kind is calculated to instil a fundamentally wrong idea of the relationship between heat and chemical affinity. In the main part of the book dealing with the elements and their compounds, the mode of treatment is broad and luminous, and the information is well selected. Some few deficiencies in detail are to be found; but, on the other hand, there are many little features in which the book is an improvement on others of like scope. The following points are, perhaps, worth noting. Cryohydrates are mostly mixtures of ice and salt, and not definite compounds, as implied on pp. 60 and 67. On p. 103, the production of iodine by the action of sulphuric acid on potassium iodide may be better explained by the reducing action of hydriodic acid on sulphuric acid than by the mere decomposition of the hydriodic acid *per se*. The preparation of silicon from silicon dioxide and of boron from boron trioxide by means of magnesium, and also the preparation of silicon hydride, easily demonstrated in test-tubes, are not mentioned, nor is justice done to the energetic properties of boron. The preparation of potassium chlorate by electrolysis of potassium chloride is not mentioned; and though the electrolytic preparation of sodium is described, the figure which illustrates the process is hardly comprehensible. Three useful appendixes on crystallography, spectrum analysis, and chemical calculations, and a series of chemical problems, conclude the book. Owing to some printing accident, the appendix on spectrum analysis ends prematurely in the middle of a sentence. A. S.

THE MODERN BICYCLE.

La Bicyclette: sa Construction et sa Forme. Par Dr. C. Bourlet. Pp. 228. (Paris: Le Génie Civil; Gauthier-Villars, 1899.)

THIS is a reproduction of a series of articles which appeared in vol. xxxiii. of *Le Génie Civil*, and forms, in some measure, a supplement to the author's "Nouveau Traité des Bicycles et Bicyclettes." With the exception of an appendix on the theory of ball-bearings, the present work is non-mathematical in character, and is addressed to all cyclists who take an intelligent interest in their machines. The first chapter is devoted to an historical summary, then follow chapters on the frame, steering, bearings, gearing, change-speed gears, wheels and tyres, tricycles, accessories, and hygiene of touring.

The work is to be warmly welcomed, as adding to the far too scanty independent literature on the construction of the bicycle. We feel somewhat at a loss, however, as to the standpoint to be taken in reviewing the book. In the historical portion many events which, on this side of the Channel at least, are regarded as of primary importance are not even referred to—*e.g.* Kirkpatrick

Macmillan and Gavin Dalzell's construction of a practical rear-driver, the appearance of the original Dunlop pneumatic tyre with outer cover cemented to the rim, while free-pedals are merely referred to as incidental accompaniments of automatic brakes. Dr. Bourlet's history of the introduction of pneumatic tyres reads like a burlesque :—

"... The first pneumatic tyres were very timid attempts, and at the best only suitable for racing tracks. . . . The single tube tyres, Clincher, Boothroyd, and others then became popular, and were a little more trustworthy. . . . It was not until Michelin put on the market his detachable tyre that pneumatic tyres entered the domain of practical cycling mechanics. . . . Six months later the Dunlop Company exhibited a detachable tyre. . . ."

Again, in the purely descriptive portions of the book many important developments of the last three or four years are entirely unnoticed ; to wit, Lloyd's cross-roller gear, the Fleuss and Trench tubeless tyres, jointless hollow rims, short-pitch roller chains, the Bowden brake transmitting mechanism ; in fact, the book is at the date of its publication several years behind the times, as far as the bicycle in England is concerned.

The discussion of the various points of construction are very interesting and instructive ; but the conclusions drawn by the author are in many cases diametrically opposed to opinions widely held on this side of the Channel. The author has proved that, for ease of steering, the frame of a good bicycle should be as short as possible ; the frame with extended wheel-base "était donc détestable ; il manquait d'ailleurs de rigidité." The frame of the Pedersen bicycle, weighing less than 20 lbs. complete, receives most praise ; but the author would improve it by substituting pin-joints for the rigid lugs. Mr. Mushing's analysis in the Centaur Company's catalogue of the weight of a bicycle equipped as a heavy roadster and as a road racer (total weights 36 lbs. and 25 lbs. respectively, weight of frame and front forks in each case 7 lbs. 15 oz.) might modify the author's opinion on this point.

In chains, a retrograde movement was effected when, in 1895, English makers returned to the detestable block chains, "un peu modifiées, il est vrai, mais toujours aussi mauvaises." Now, whatever be the merits of the 1899 roller chains, the old inch-pitch roller chains were much worse than the block chains which superseded them. Has the author compared, say, a Hans Renold block chain with the roller chains made prior to 1895 ? The type of roller chain held up for admiration is that with each sleeve split at the middle, a half-sleeve being made as a solid internal projection from each inner side-plate. This construction is thoroughly bad, and no chain made in this way is durable, as some chain-makers have found to their cost.

A great number of two-speed gears are described, none of which have been sold to any extent in England, while the few two-speed gears known here are not referred to. This chapter is therefore of interest mainly to the mechanician and the designer.

As a practical guide to the cyclist in choosing a new machine, the book will be of most service in France, but of little or no value here.

A. S.

NO. 1543, VOL. 60]

OUR BOOK SHELF.

The Spirit of Organic Chemistry. By Arthur Lachman, B.S., Ph.D. With an Introduction by Paul C. Freer, M.D., Ph.D. Pp. ix + 229. (New York : The Macmillan Company. London : Macmillan and Co., Ltd., 1899.)

THE title of the book, if it conveys a definite idea, scarcely explains the contents. The preface, however, sets forth the various objects which the book is intended to accomplish. Its main purpose, we are told, is to supplement the text-book and to introduce the student to the current literature of the subject, from which it is to be inferred that he will be equipped with a sufficient knowledge of present problems to follow contemporary research.

The volume consists in reality of a series of essays on subjects which have at one time or another engaged the attention of chemists. It is divided into chapters, the heading of each furnishing the text for a discourse on some prominent theory or classical investigation. "The constitution of acetoacetic ether" leads up to an account of *tautomerism*. The constitution of the sugars, of maleic and fumaric acids, of the oximes and of the diazobenzene compounds, involve a series of dissertations on stereochemical problems ; whilst the chapters on uric acid and the constitution of rosaniline record the development of certain branches of synthetic chemistry. An essay on the constitution of benzene, and a brief history of "Perkin's reaction," complete the series. The subjects are not by any means exhaustively treated ; but they are presented in an easily readable form, and controversial matters are handled in a judicial spirit.

Whether these few essays will enable the student to follow current literature is another question. A great amount of organic research is now busy with the constitution of the terpenes, the camphors, the alkaloids, the artificial and natural colouring matters, and many other subjects of which no word is said. Moreover, several of the subjects discussed have passed into history. Still, there will doubtless be many to whom the volume should prove interesting and profitable reading.

The introductory chapter does not add substantially to the value of the book. Its rather high-sounding phrases convey little real information, and the historical references are too brief to be intelligible to any one ignorant of the history of the science.

J. B. C.

Elementary Physics and Chemistry. First Stage. By Prof. R. A. Gregory and A. T. Simmons, B.Sc. Pp. viii + 150. (London : Macmillan and Co., 1899.)

THE importance of experimental science teaching in elementary schools is being more and more recognised by the Education Department every year. This tendency is seen in the course of elementary physics and chemistry for the upper standards, which was introduced into the Elementary Education Code for 1898. To meet the want thus created is the purpose of the present book, covering the first of the three parts into which the syllabus is divided. The plan of the book is admirable, and though the division of each lesson into "what to do," "reading lesson," and things "to be remembered," involves a certain amount of repetition, there will be compensation to young students in the resulting clearness. Matters are so arranged that the lessons are suitable for classes in which each pupil can perform the experiments for himself, or for those in which they can be made by the teacher alone. In their anxiety to secure a logical sequence of thoughts, the authors have included a few experiments, the results of which we think might have been taken for granted ; but, apart from this, the book seems well adapted for beginners in science. The clear and simple language, combined with a large number of excellent illustrations, can surely leave no doubt in the mind of the dullest pupil as to the ideas which are intended to be conveyed.